

5 DISCUSSION



Making lead plates used in automobile batteries

Work-Related Lead Poisoning is Still a Problem

Lead poisoning persists as a serious occupational health problem in California 23 years after adoption of a comprehensive general industry lead standard by the Occupational Safety and Health Administration (OSHA). Despite widespread failure of employers to conduct routine BLL testing of lead-exposed employees, OLPPP received thousands of reports of elevated BLLs (25 $\mu\text{g}/\text{dl}$ or greater) in workers during the five-year period covered by this report (2,657 individuals). The overwhelming majority of individuals reported to the Registry were male, with an age range typical of a working population (95% between 20 and 59 years of age). Individuals with Spanish surnames were disproportionately represented; California's workforce is 28% Hispanic, whereas the proportion of Spanish surnames among individuals reported to the Registry between 1995 and 1999 was 52%. A large portion (42%) of workers with BLLs 25 $\mu\text{g}/\text{dl}$ or higher were employed in Los Angeles County. This reflects the concentration of California lead industries in this county.

Reports of BLLs 25 $\mu\text{g}/\text{dl}$ or greater were not confined to just a few industries; 117 unique four-digit SIC codes were assigned to employers during the period 1995-1999. All ten of the "Top Ten" industries with the largest number of workers reported with elevated BLLs were also on the list in 1993 or in 1994; in fact, the top three of these remained in the same order (battery manufacturing, secondary nonferrous smelters, and radiator repair). Thirty-two percent of the workers identified with BLLs 25 $\mu\text{g}/\text{dl}$ or greater¹⁰ during this five-year period worked in battery manufacturing plants. Large numbers also worked in secondary nonferrous smelters and battery recycling plants (10%) and automotive radiator repair shops (9%). Eighteen percent of all workers identified with BLLs 25 $\mu\text{g}/\text{dl}$ or greater were employed in the construction trades; however, construction workers made up a disproportionate number of reported serious lead poisoning cases (60 $\mu\text{g}/\text{dl}$ or greater) with 13 of the total 39 cases (33%).

It is not possible to draw conclusions from these data about the relative risk of lead poisoning in these industries compared to other lead-using industries since so few employers do routine BLL testing. These data do show, however, that the problem is widespread and that it persists in industries in which historically lead poisoning has occurred and where lead hazards are widely known.

¹⁰ Two hundred forty-nine (249) workers with unknown industry were excluded from the total 2,657 workers.

Lead Poisoning is Caused by Many Factors

During the five-year period 1995-99, OLPPP investigated 39 cases of workers with BLLs of 60 µg/dl or greater. Some of these serious cases of lead poisoning were uncovered only when the worker's personal physician tested him for lead, rather than as part of a company lead medical program. Extremely high BLLs were found in a worker abrasive blasting paint off a bridge (221 µg/dl) and in several workers compounding plastic resins (108 –164 µg/dl). Two industrial processes, compounding plastics for electrical products and sanding antique furniture from which the paint had been chemically stripped (CDC, 2001), appeared for the first time among California cases of serious lead poisoning.

During the same period, we investigated take-home lead poisoning cases involving 40 children and 1 adult family member. The largest number of take-home cases (13) was in the radiator repair industry. In addition, three cases occurred in home-based businesses involving ceramic tile painting, fishing weight casting, and scrap metal handling. County Childhood Lead Programs identified most of the take-home cases through follow-up of children with elevated BLLs. Many of these children were screened by primary providers following CDC guidelines (CDC, 1997). The number of take-home case referrals from counties has increased greatly from our 1993-94 Registry Report (OLPPP, 1997). The increase in referrals is likely due to OLPPP's training of county Childhood Lead Program staff and the addition of OLPPP's phone number to the Childhood Lead Program home investigation form with a reminder to call us if take-home exposure is suspected.

Several key points emerge from OLPPP's investigation of worker and take-home cases of lead poisoning. As in prior years, lead poisoning cases were linked to lack of training in lead hazards, poor ventilation, improper respiratory protection, unsafe

clean-up methods (e.g., dry sweeping), poor hygiene facilities or practices, lack of protective clothing or equipment, and lack of air monitoring data or adequate lead medical programs to guide control efforts. Among small employers, there was frequently a complete lack of awareness about lead hazards and how to control them, even in industries where the risks of lead exposure are well known to occupational health professionals. Many physicians lack experience in handling adult cases of lead poisoning and are unfamiliar with Cal/OSHA's requirements for medical surveillance and follow-up of lead-exposed workers. In some cases, OLPPP had to intervene to prevent inappropriate medical treatment of lead-poisoned workers.



Worker cleaning bullet trap at firing range

Data Limitation: Most Employers Do Not Test

Our interpretation and discussion of Registry data are limited by several problems inherent to the information collected by the Registry. The most serious limitation is that the majority of workers at risk for lead overexposure do not have their blood lead levels tested. Studies of employers in lead industries have found that a low percentage conduct periodic BLL testing. A broad survey of California facilities engaged in lead-using processes found that only 1.4% had routine blood lead testing programs and about 2.6% of potentially lead-exposed workers were estimated to receive routine BLL testing (Rudolph, 1990). A survey of employers in general industry in Los Angeles County found that fewer than half of the surveyed facilities with potentially significant lead exposures conducted routine blood lead testing (Papanek, 1992). Provision of periodic BLL testing varied by industry and company size, with small employers being less likely to have measured worker blood lead levels. Finally, a more recent general industry employer survey conducted in Washington State found that only 17% of respondents who reported that they engaged in lead-using tasks had done BLL testing (Nelson, 1998).

Data generated by OLPPP's census of lead-using industries also indicate that blood lead testing of exposed workers is likely very low in some large industries in which lead is used or disturbed. Between 1996 and 2000, OLPPP conducted a census of the battery manufacturing, nonferrous foundry, radiator repair, and wrecking and demolition industries. For each industry, OLPPP called or mailed a brief questionnaire to all California companies in that industry listed by commercial marketing databases. The questionnaire gathered information on the type of work the company did, their lead use, and their lead safety program.

Of the 15 lead-acid battery manufacturers identified through the census, 13 (87%; covering 95% of the battery workers) had BLL test results in the Registry¹¹. Among the 27 lead-using nonferrous foundries¹², 15 companies (56%) had BLL test results in the Registry. Although 340 copper-brass radiator repair shops reported they had one or more employees, there were only 49 radiator repair companies (14%) in the Registry. Finally, although 596 companies reported that they did wrecking and demolition work, there were only 7 wrecking and demolition companies (1%) in the Registry. Although some companies may not appear in the Registry because they maintain employee BLLs below the reportable level of 25 µg/dl, it is unlikely that this could account for the large percentage of nonferrous foundry, radiator repair, and wrecking and demolition employers not in the Registry.



Ceramics manufacturing: Applying a lead-containing glaze

¹¹ Comparisons here are made for the year in which each census was conducted; i.e., 1996 for battery manufacturing, 1997 for nonferrous foundries, 1998 for wrecking and demolition, and 2000 for radiator repair.

¹² Four companies are excluded because their air lead levels were below the OSHA-required level for BLL testing.

Published reports and OLPPP's census results indicate that although compliance with the BLL testing requirements of the OSHA standards varies by industry, it is likely poor among many industries that use or disturb lead. The result of this large-scale deficiency in testing of lead-exposed workers is that a large proportion of the true number of lead-exposed individuals with elevated BLLs will not be captured by the Registry.

Registry records indicate that even employers who do test may not be providing the periodic BLL testing required by Cal/OSHA. A review of the data for 1995-1999 show that of workers with a peak BLL 25 µg/dl or greater, 52% had 3 or fewer BLL tests in that five-year period, and 27% had only one test. However, this is a rough estimate, since BLLs less than 25 µg/dl may not appear in the Registry, and some workers may not have received additional BLL tests because they left the job.

Data Limitation: Reporting of Lower BLLs Not Required

At present, laboratories are not required to report BLLs below 25 µg/dl. Without reporting of all BLLs we cannot accurately determine the distribution of BLLs among those workers who are tested or calculate rates of lead poisoning in groups and industries of interest. We also cannot evaluate employer compliance with Cal/OSHA's blood lead testing requirement since we cannot distinguish employers not doing BLL testing from those who do routine testing but maintain BLLs below the reportable limit. Finally, we cannot monitor the progress of individual companies or industries in achieving lower BLLs.

Strategies for Improving the Registry

Ideally, the California Occupational Blood Lead Registry would capture a large proportion of the total number of individuals with elevated BLLs ("completeness of coverage") and the information collected would truly describe the occurrence of lead poisoning over time and its distribution by place and person ("representativeness"). In practice, the current system falls seriously short of this ideal for the reasons discussed above. In order to make the Registry a more powerful tool for preventing lead poisoning, we must increase the proportion of employers providing BLL testing, improve the accuracy and completeness of the descriptive information on Lead Reporting Forms (LRFs), and change reporting requirements so that all BLLs are reported to CDHS regardless of level and in a timely manner. Below we discuss current and proposed CDHS and OLPPP activities which will move us closer to these goals.

Revision of Reporting Requirement

CDHS is currently pursuing a requirement for laboratories to submit *all*, not just elevated, BLL test results. Once implemented, this will allow us to: 1) more accurately describe the distribution of BLLs among those workers being tested; 2) calculate rates of elevated BLLs for specific groups of workers (by industry, employer, etc.); and 3) enhance our ability to monitor compliance with the medical surveillance requirements of the lead standards and the progress of employers and industries in controlling lead exposures.

Expanding Routine BLL Testing

Employer failure to conduct routine blood lead testing as required by the Cal/OSHA lead standards is a difficult issue to address. Employers and workers have told us that there are a number of disincentives and barriers to testing. These include: unfamiliarity with occupational medicine and difficulty identifying a medical provider to conduct testing; lack of understanding of the value of BLL testing and the meaning of BLL test results; disruption of work schedules and lost work time; difficulty of scheduling worker clinic visits during work hours; lack of on-site BLL testing services; fear that a high BLL will lead to a Cal/OSHA inspection or a worker lawsuit; belief that BLL testing is unnecessary because other elements of a company's lead safety program are in place; and worker fear that blood drawn for BLL tests will also be tested for illicit drug use.

OLPPP has attempted to address some of these disincentives and barriers as well as motivate employers to test through our educational and other efforts. OLPPP training activities and educational materials include information on Cal/OSHA blood lead testing requirements, the value of BLL testing, and how to set up a lead medical program and interpret and use test results to improve an employer's lead safety program. Individual technical assistance to employers by phone is another way that OLPPP educates employers about their responsibility to provide testing. In addition, under contract with OLPPP, UCLA-LOSH¹³ developed a list of occupational medicine providers in the five-county Southern California region to assist employers in identifying lead medical services. Even with these efforts, however, too few employers are providing routine BLL testing.

With this in mind, OLPPP has embarked on a focused effort to develop a strategy for increasing BLL testing among California's industrial construction contractors (iron work, industrial painting, wrecking and demolition). Very high levels of lead exposure are possible in these industries and few employers appear to be testing. To start, we are researching the level of awareness of BLL testing in these industries, who tests and why, what elements in the work environment affect an employer's willingness or ability to provide testing, and what motivates employers to make health and safety changes. We are also asking industry trade associations, unions, and contractors what they would suggest doing to increase blood lead testing in their industry. We will use the results of this research to design an intervention to increase BLL testing among industrial contractors. We plan to do similar work with general industry employers in the future.

Efforts by others, particularly Cal/OSHA, can also have an impact on blood lead testing. One effort by Cal/OSHA, the Lead in Construction Special Emphasis Program, has resulted in an increase in the number of inspections of construction work sites where lead is disturbed. Still, Cal/OSHA does not have sufficient resources to monitor all California's lead industries to insure compliance with the lead standards, including the medical surveillance requirement. With increased resources, Cal/OSHA could have a greater impact on employer compliance with the blood lead testing requirements in the future.

¹³ University of California at Los Angeles, Labor Occupational Safety and Health program

Registry Data Guide Our Prevention Activities

OLPPP's list of the ten industries with the largest number of workers reported with elevated BLLs guides our prevention efforts. Since 1995, OLPPP has carried out education efforts in five of these ten industries: residential painting, industrial/commercial construction, radiator repair, scrap metal recycling, and firing ranges.

With residential painting contractors, OLPPP conducted a two-year project to design, implement, and evaluate a multi-dimensional intervention strategy to prevent lead poisoning among house painters (Materna, 2002; Scholz, 2002). Participants received 32 hours of lead instruction, a lead safety manual, industrial hygiene services, and assistance setting up a lead medical program. Using lessons learned from this project, OLPPP later held 34 half-day lead safety awareness seminars around the state, reaching over 1300 residential painters and remodelers. During 1999-2001, six half-day seminars were held for over 500 industrial/commercial construction contractors and union representatives whose work on bridges, commercial building remodeling, and earthquake retrofits involves lead. Currently, OLPPP is providing on-site education and air monitoring to 60 radiator repair shops that were identified by our census as at highest risk for lead exposure.

In Southern California, we contracted with UCLA-LOSH to provide education in lead safety to the scrap metal recycling and the firing range industries. We also contracted with REBRAC¹⁴, a community college-based environmental consulting program specializing in small businesses, to provide on-site technical assistance and air monitoring for 15 scrap metal recycling and firing range companies in Los Angeles, Orange, and Riverside counties.

OLPPP continues to develop educational materials, many of which are translated into Spanish since Registry data show that a large percentage of

lead workers are Spanish-speaking. Each year OLPPP disseminates these materials to hundreds of lead industry employers, workers, health and safety consultants, government agency staff, and members of the public.

Individual case investigations can also lead to broader efforts to prevent lead poisoning. In follow-up to our investigation of several serious lead poisonings at a plastics compounding company, OLPPP sent an alert letter to 392 California employers in the plastics industries. The letter warned employers of the potential for serious overexposure to lead during compounding of plastics for electrical products. In addition, at OLPPP's request, the industry trade association posted our alert on its web site and included an article about the issue in their membership newsletter.



Bridge work: Cutting lead-painted metal with a torch

¹⁴ Regional Environmental Business Resource and Assistance Centers